

ANCYLOSTOMA BRAZILIENSE

BY

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In a recent paper, Dr. Gordon (1922) reports finding *Ancylostoma braziliense* in man in four out of sixty-four autopsies performed in Manáos, Amazonas, Brazil, and concludes thus:— 'The comparison of these worms and other two-toothed ancylostomes from dogs and cats in North Brazil and India, and also from cats in South Africa and dogs in West Africa, failed to show the difference claimed to exist by de Faria between *A. ceylanicum* and *A. braziliense*.'

It is very desirable that a decision on the matter of identity of these worms should be generally accepted, and the first step necessary seems to be a historical survey rather fuller than that which Gordon supplies.

Gomes de Faria (1910) described *Ancylostoma braziliense* from *Felis domesticus* and *Canis familiaris* in Brazil. Looss (1911) described *Ancylostoma ceylanicum* from the civet cat, *Viverricula malacensis*, in Colombo, Ceylon. Leiper (1913), without examination of *A. braziliense*, suggested, from the appearance of the dorsal ray as figured by de Faria, that the two forms were identical, this ray having, he stated, a pair of digitations only on each of its two branches (Leiper (1915)), a statement which, however, requires alteration (Clayton Lane (1916)). Clayton Lane (1913) first recorded *A. ceylanicum* as a parasite of man, a fact since amply confirmed from various parts of the world, thereby giving to the question of nomenclature a medical interest. De Faria (1914) published a short paper in which he quotes a letter from Looss, who therein states emphatically that *A. braziliense* has only a single tooth on each ventral tooth plate; that its bursal rays, especially the externo-dorsal, are remarkable for their length and delicacy; and that the relative thickness of the bursal rays is a definite differential [specific] character. De Faria (1916), after examining abundant

Brazilian material and comparing it with specimens of *A. ceylanicum* sent by Clayton Lane from Bengal, verifies the existence of the inner pair of teeth, which he describes as much smaller than are those of the Indian forms, but holds, nevertheless, that this comparative examination disposes completely of Leiper's suggestion mentioned above. One of Looss's specific criteria being thus swept away, the specific differences held to obtain between the two forms rested upon the relative slenderness of the bursal rays. In this relation, Gordon published measurements of the externo-dorsal ray of Brazilian forms and of forms supplied to him from Bengal by Clayton Lane. These measurements provided him with no constant differences, nor could he detect other constant distinctions between worms from these two areas or from Africa.

The present intervention is prompted by two motives. The first is that the writer is credited by Gordon with supporting de Faria in his basis of specific differentiation. This is not exactly the case. What he actually did (Clayton Lane (1916)) was to comment upon the complete absence in existing descriptions of measurements of the internal organs; to express disbelief in Looss's statement that only a single pair of teeth existed, it being inconceivable that de Faria should describe and draw a non-existent tooth; to accept Looss's and de Faria's statements that the bursal rays of the Brazilian form were strikingly fine; and to point out that, accepting this as a fact, there emerged the almost certain conclusion that two species were being dealt with. There was this significant addition, 'It will probably be generally felt that there must be a thorough and independent examination by another experienced helminthologist before the question can be considered as settled.' This examination has been made by Gordon, but even his published report leaves certain matters doubtful. The receipt of some material furnished by his courtesy, together with the importance of settling definitely, if possible, the specific name of a parasite of man (the second of the motives to which reference was made above) prompts the present note.

An examination of the appended Table of Measurements mainly dealing with the internal organs of these forms, published apparently for the first time so far as the Brazilian ancylostomes are concerned, affords no justification for the duality of species. On

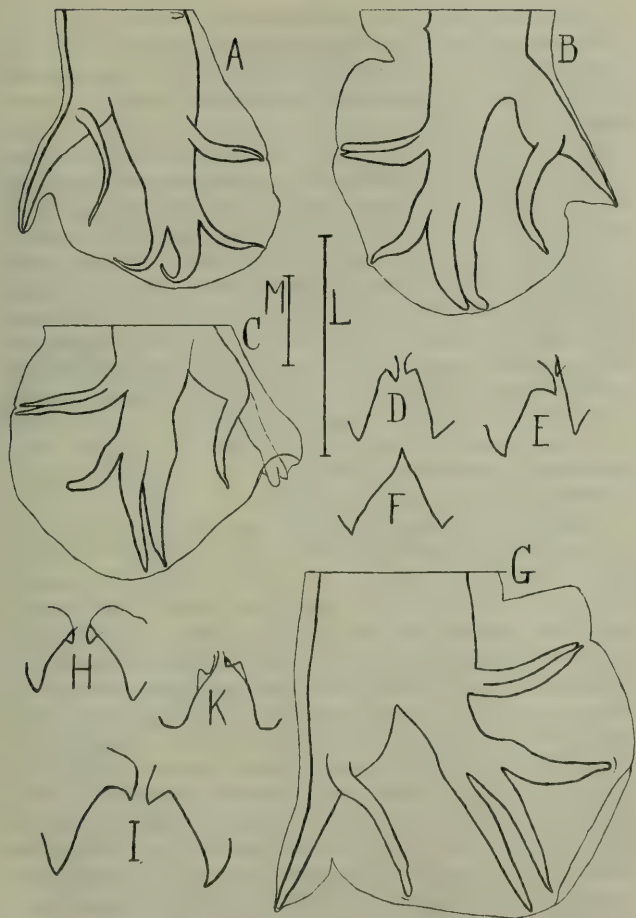


FIG. 1. *Ancylostoma braziliense*

Brazilian forms :

A, B, and C, the bursae of males.

D, E, and F, the tooth-plates of males.

Indian forms :

G, the bursa of the male.

H, I, and K, the tooth-plates ; H and K of males, I of a female.

Scales :

L, scale for D, E, F, H, I, and K representing 0.1 mm.

M, scale for A, B, C, and G, representing 0.1 mm.

the other hand, it gives no proof of unity of species, as is clear when one considers, for example, the relative measurements of the various members of the genus *Trichostrongylus*. This question must under the circumstances be determined by shape, as, indeed, should always be the case.

Taking first the male bursa: Figs. A, B, and C are from Gordon's Brazilian material; fig. G from the dog in Bengal. Fig. B is typical of the stout-rayed condition generally ascribed to *A. ceylanicum*. In fig. A the rays are much finer. Fig. C shows a condition on the whole intermediate between the other two, although the externo-dorsal ray is short, ending far from the edge of the bursa, while the ventral rays and the internally-terminating lateral ones are pointed. This evidence demonstrates considerable individual variation upon those very points which are held constant within the species. This circumstance led naturally to a re-examination of Indian material. Almost at once the form represented in fig. G was found. Its relatively fine lateral rays are not those associated with the accepted descriptions of *A. ceylanicum*, and yet they are from Indian material.

Turning to the ventral oral plate, figs. D, E and F are from Gordon's Brazilian material. The first shows a direct dorsal view from a male worm, with the inner, deeper teeth fairly marked. Fig. E is that of another male viewed dorso-laterally; the obliquity brings into evidence and increases the apparent size of one deep tooth and obscures and minimises the other. In fig. F, clearing in creosote of this worm, which had lain long in lacto-phenol, was unsatisfactory and the deep teeth were invisible in a direct dorsal view. With lateral tilting their points could just be distinguished. Figs. B and F are from one and the same worm, apparently stout bursal rays being associated with apparent absence of the inner teeth. Figs. H, I and K are from Indian material, fig. I being from a female worm. Fig. K corresponds to fig. F. In it the inner tooth on one side is completely, and on the other almost completely, hidden by the large superficial outer tooth, and, had the specimen been imperfectly cleared, these would have been invisible.

The evidence which has just been given shows that the bursal rays of these two-toothed forms, from whatever part of the world

they come, present great individual differences in length and width, the former partly real, partly apparent, and due to the foreshortening caused by the incurving of the bursal edge; and that marked variations occur in the apparent size of the inner teeth, variations which can indeed, to some extent at least, be produced at will by the rolling of the worm. Both features are largely independent of the country of origin. Indeed, one must conclude that individual prepossession will play a preponderating part in determining whether any particular two-toothed ancylostome of this type is to be classified as *A. braziliense* or *A. ceylanicum*. In other words, there is no evidence offered that acceptable specific differences exist between individuals from the Old and New Worlds. In the absence of such evidence, *Ancylostoma* (*Ceylancylostoma*) *ceylanicum* (Looss (1911)) lapses as a synonym of *Ancylostoma* (*Ceylancylostoma*) *braziliense* (Gomes de Faria, (1910)).

TABLE

Measurements in millimetres of Males of *Ancylostoma braziliense* from Brazil, and *A. ceylanicum* from Bengal.

	Brazilian form	Indian form
Oral cavity, length	0'14	0'143
Oral cavity, transverse diameter	0'08	0'09
Oral cavity, dorso-ventral diameter	0'07	0'087
Nerve collar from head end	0'7	0'57
Cervical papillae ,,	0'55	0'57
Excretory pore ,,	0'55	0'57
Width of cuticular striation	0'007	0'0075
Oesophagus, length	0'6	0'7
Oesophagus, breadth	0'1	0'15
Length of spicules	0'8 to 0'9	0'8
Length of accessory piece	0'065	0'075
Length of Cement gland	2'0	3'0

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